All India Test Series (2023-24)

Test Code: ANY/12 | **AITS TEST - 12** | **YAKEEN NEET**

DURATION: 200 Minutes | **DATE: 27/04/2024** | **M. MARKS: 720**

ANSWER KEY

(PHYSICS)

SECTION-A

1.	(3)	8.	(2)	15.	(1)	22.	(1)	29.	(4)
2.	(4)	9.	(2)	16.	(2)	23.	(3)	30.	(3)
3.	(4)	10.	(3)	17.	(1)	24.	(2)	31.	(3)
4.	(3)	11.	(3)	18.	(3)	25.	(2)	32.	(2)
5.	(2)	12.	(4)	19.	(2)	26.	(3)	33.	(3)
6.	(1)	13.	(1)	20.	(3)	27.	(1)	34.	(3)
7.	(1)	14.	(3)	21.	(1)	28.	(4)	35.	(4)

SECTION-B

36.	(3)	39.	(1)	42.	(4)	45.	(2)	48.	(1)
37.	(1)	40.	(3)	43.	(1)	46.	(1)	49.	(2)
38.	(3)	41.	(1)	44.	(4)	47.	(1)	50.	(2)

(CHEMISTRY)

SECTION-A

51.	(1)	58.	(1)	65.	(2)	72.	(4)	79.	(1)
52.	(1)	59.	(3)	66.	(3)	73.	(3)	80.	(4)
53.	(1)	60.	(1)	67.	(2)	74.	(3)	81.	(3)
54.	(1)	61.	(1)	68.	(4)	75.	(4)	82.	(4)
55.	(2)	62.	(2)	69.	(2)	76.	(4)	83.	(3)
56.	(2)	63.	(4)	70.	(1)	77.	(1)	84.	(2)
57.	(4)	64.	(3)	71.	(4)	78.	(3)	85.	(1)

SECTION-B

86.	(4)	89.	(2)	92.	(2)	95.	(2)	98.	(1)
87.	(3)	90.	(1)	93.	(1)	96.	(1)	99.	(4)
88.	(3)	91.	(4)	94.	(2)	97.	(4)	100.	(2)

(BOTANY)

SECTION-A

101.	(4)	108.	(2)	115.	(1)	122.	(3)	129.	(3)
102.	(4)	109.	(4)	116.	(3)	123.	(2)	130.	(2)
103.	(1)	110.	(2)	117.	(3)	124.	(1)	131.	(2)
104.	(4)	111.	(1)	118.	(4)	125.	(3)	132.	(1)
105.	(3)	112.	(1)	119.	(3)	126.	(3)	133.	(2)
106.	(4)	113.	(4)	120.	(4)	127.	(3)	134.	(3)
107.	(3)	114.	(4)	121.	(3)	128.	(4)	135.	(1)

SECTION-B

136.	(1)	139.	(4)	142.	(2)	145.	(2)	148.	(4)
137.	(2)	140.	(2)	143.	(1)	146.	(3)	149.	(4)
138.	(2)	141.	(4)	144.	(1)	147.	(3)	150.	(4)

(ZOOLOGY)

SECTION-A

151.	(3)	158.	(4)	165.	(2)	172.	(1)	179.	(4)
152.	(4)	159.	(2)	166.	(1)	173.	(3)	180.	(4)
153.	(1)	160.	(2)	167.	(1)	174.	(1)	181.	(3)
154.	(3)	161.	(4)	168.	(2)	175.	(3)	182.	(4)
155.	(3)	162.	(2)	169.	(3)	176.	(2)	183.	(2)
156.	(4)	163.	(3)	170.	(1)	177.	(2)	184.	(3)
157.	(3)	164.	(3)	171.	(4)	178.	(1)	185.	(2)

SECTION-B

186.	(4)	189.	(4)	192.	(2)	195.	(3)	198.	(2)
187.	(2)	190.	(3)	193.	(3)	196.	(1)	199.	(4)
188.	(1)	191.	(1)	194.	(4)	197.	(4)	200.	(1)

(PHYSICS)

SECTION-A

1. (3)

In uniform electric field,

PD, $V = E.d$

or $V_A - V_B = 300 \times 2 \times 10^{-2}$

$= 6$ V

(NEW NCERT 12th Page No. 51, 52 and 53)

2. (4)

Angular velocity, $\omega = \frac{d\theta}{dt} = \frac{d}{dt}\left[\frac{3t^4}{8} - \frac{t^2}{2}\right]$

$= \frac{3}{8} \times 4t^3 - \frac{1}{2} \times 2t = \left(\frac{3}{2}t^3 - t\right)$ rad/s

Angular acceleration, $\alpha = \frac{d\omega}{dt} = \frac{d}{dt}\left[\frac{3}{2}t^3 - t\right]$

$= \frac{3}{2} \times 3t^2 - 1$

$= \left(\frac{9}{2}t^2 - 1\right)$ rad/s^2

Angular acceleration at $2s = \frac{9}{2} \times 2^2 - 1$

$= 17$ rad/s^2

(NEW NCERT 11th Page No. 118, 119 and 120)

3. (4)

Hole acts as a virtual charge, although there is no physical charge on it.

(NEW NCERT 12th Page No. 329, 330, 331 and 332)

4. (3)

$T_1 = 273 + 27 = 300\,K$

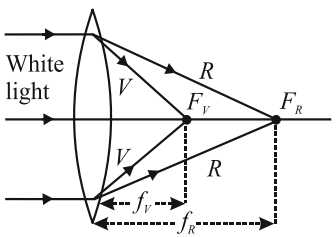
For constant volume $\frac{P_1}{T_1} = \frac{P_2}{T_2}$

$\Rightarrow \quad T_2 = T_1 \times \frac{P_2}{P_1} = 300 \times \frac{3}{1}$

$= \quad 900$ K $= 900 - 273 = 627°$C

(NEW NCERT 11th Page No. 203 and 204)

5. (2)



Focal length of a lens depends on wavelength.

$\because \quad \frac{1}{f} \propto (\mu - 1) \propto \frac{1}{\lambda} [f \propto \lambda]$

$\therefore \quad f_R > f_V$

(NEW NCERT 12th Page No. 234 and 235)

6. (1)

Initially the speed is zero, then increases at a decreasing rate & after some time it becomes constant. Acceleration (slope of *v*-*t* curve) of ball first decreases and after some time it becomes zero.

(NEW NCERT 11th Page No. 190, 191 and 192)

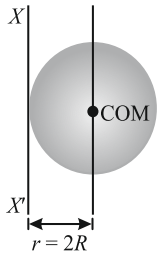
7. (1)

From theorem of parallel axis,

$I_{XX'} = I_{COM} + Mr^2$

$= \frac{2}{5}M(2R)^2 + M(2R)^2$

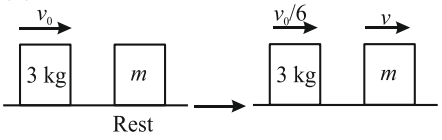
$= \frac{28}{5}MR^2$



Radius of gyration, $K = \sqrt{\frac{I}{M}} = \sqrt{\frac{\frac{28}{5}MR^2}{M}} = \sqrt{\frac{28}{5}}R$

(NEW NCERT 11th Page No. 114, 115 and 116)

8. (2)



By conservation of linear momentum

$3v_0 = 3\left(\frac{v_0}{6}\right) + mv \Rightarrow 3v_0 = \frac{v_0}{2} + mv$

$\Rightarrow \quad \frac{5v_0}{2} = mv$ ….. (i)

Since, collision is elastic

$v_{separation} = v_{approach} \Rightarrow v - \frac{v_0}{6} = v_0$

$\Rightarrow \quad \frac{7v_0}{6} = v$ ….. (ii)

Equating equation (ii) and (i);

$\frac{5v_0}{2} = m\left(\frac{7v_0}{6}\right) \Rightarrow m = \frac{15}{7}$ kg

(NEW NCERT 11th Page No. 83, 84, 85 and 86)

9. (2)

Magnetic field produced by a long solenoid is

$B = \mu_0 nI$, where $n = \frac{N}{\ell}$

$\because$ Same number of turns wound over one third length.

$\therefore$ Magnetic field produced by new solenoid is

$$B' = \mu_0\left(\frac{N}{\ell/3}\right)I = 3\left(\frac{\mu_0 NI}{\ell}\right) = 3B$$

(NEW NCERT 12th Page No. 121 and 122)

10. (3)

$$L_n = n\left(\frac{h}{2\pi}\right)$$

For $n = 4$, $L_4 = 4\left(\frac{h}{2\pi}\right) = \frac{2h}{\pi}$

(NEW NCERT 12th Page No. 295 and 296)

11. (3)

Given,

Real depth, d = 30 cm and apparent shift, x = 7.5 cm

Shift, $x = d\left(1 - \frac{1}{\mu}\right)$ ..... (i)

Substituting the values in equation (i)

$7.5 = 30\left(1 - \frac{1}{\mu}\right)$

$\Rightarrow \frac{7.5}{30} = 1 - \frac{1}{\mu}$

$\Rightarrow \mu = \frac{4}{3}$

(NEW NCERT 12th Page No. 228 and 229)

12. (4)

$$P = P_0 + \frac{4T}{R}$$

$\Rightarrow$If R increases then P decreases.

(NEW NCERT 11th Page No. 180, 181, 182, 183, 184, 185 and 186)

13. (1)

Both refractive index and strain are dimensionless quantities.

[Momentum] = [$M^1L^1T^{-1}$]

[Pressure] = [$M^1L^{-1}T^{-2}$]

[Planck's constant] = [$M^1L^2T^{-1}$]

(NEW NCERT 11th Page No. 7)

14. (3)

The relation between the magnitudes of maximum electric field (E_m), maximum magnetic field (B_m) and speed of light in vacuum (c) is $c = \frac{E_m}{B_m}$

$\therefore$ The maximum value of electric field,

$E_m = B_m \times c$

$= (2.09 \times 10^{-7} \times 3 \times 10^8)$ V/m

$= 62.7$ V/m

(NEW NCERT 12th Page No. 205, 206 and 207)

15. (1)

$v_d = \mu E$, μ = mobility of free electrons = $\frac{e\tau}{m}$ and

E = electric field = $\frac{V}{L}$

So, $v_d = \mu\frac{V}{L}$; here μ is constant.

If V and L are constant then v_d does not depend on area.

(NEW NCERT 12th Page No. 85, 86 87 and 88)

16. (2)

$$\lambda = \frac{h}{p} = \frac{h}{qBr} \qquad \left[\because \frac{mv^2}{r} = qvB\right]$$

$$= \frac{6.6\times10^{-34}}{2\times1.6\times10^{-19}\times0.5\times4.125\times10^{-2}}$$

$\lambda = 1\times10^{-13}$ m

$= 0.001$ Å

(NEW NCERT 12th Page No. 284, 285 and 286)

17. (1)

Area of loop, $A = 0.04$ m^2,

$B = 1.5$ T and $\theta = 90° - 30° = 60°$

So, the flux linked with the loop is $\phi = BA\cos\theta$

$= 1.5\times0.04\times\cos60°$

$= = 1.5\times0.04\times\frac{1}{2} = 0.03$ Wb

(NEW NCERT 12th Page No. 156 and 157)

18. (3)

Permittivity constant (of free space) =

$$\frac{\text{Charge} \times \text{charge}}{4\pi \times \text{Electric force} \times (\text{Distance})^2}$$

$$= \frac{[AT][AT]}{[MLT^{-2}][L]^2} = [M^{-1}L^{-3}T^4A^2]$$

(NEW NCERT 11th Page No. 7)

19. (2)

Given,

Work function, W = 2.3 eV

Maximum kinetic energy, $K_{max} = 2.1$ eV

$\therefore$ Energy of incident radiation, $E = K_{max} + W$

$= (2.1 + 2.3)$ eV

$= 4.4$ eV

Now, E (in eV) = $\frac{12375\ eV\text{Å}}{\lambda(\text{in Å})}$

$\therefore \quad \lambda(\text{in Å}) = \frac{12375}{4.4} \approx 2800\,\text{eV}$

(NEW NCERT 12th Page No. 281, 282 and 283)

20. (3)

A full-wave rectifier rectifies both the half cycles of the AC output i.e. it conducts twice during a cycle.

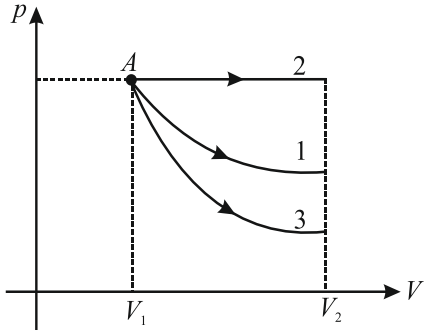
So, frequency of AC output = 2 × frequency of AC input

= 2 × 50 = 100 Hz.

(NEW NCERT 12th Page No. 338, 339 and 340)

21. (1)

The corresponding *p*-*V* graphs in three different processes will be as shown below.



Area under the pV graph gives the work done by the gas.

$(\text{Area})_2 > (\text{Area})_1 > (\text{Area})_3 \Rightarrow W_2 > W_1 > W_3$

(NEW NCERT 11th Page No. 233, 234 and 235)

22. (1)

The decreasing order of the wavelength for the given rays is opposite to the order of their frequencies because the frequency of the wave is inversely proportional to the wavelength.

The order of frequency for the waves is:

microwave < infrared < UV < gamma rays

Therefore, the decreasing order of wavelength is:

microwave > infrared > UV > gamma rays

(NEW NCERT 12th Page No. 205, 206 and 207)

23. (3)

Velocity is slope of *x*–*t* graph

$V = \frac{dx}{dt} = \tan\theta$

$\frac{V_1}{V_2} = \frac{\tan\theta_1}{\tan\theta_2} = \frac{\tan 30^\circ}{\tan 45^\circ} = \frac{1}{\sqrt{3}}$

(NEW NCERT 11th Page No. 17, 18, 19, 20 and 21)

24. (2)

Phase difference corresponding to the given path difference $\Delta x = \frac{\lambda}{3}$ is;

$\phi = \left(\frac{2\pi}{\lambda}\right)\left(\frac{\lambda}{3}\right) = \frac{2\pi}{3}$ or $\frac{\phi}{2} = \frac{\pi}{3}$

$\therefore \quad I = I_0 \cos^2\left(\frac{\pi}{3}\right) = \frac{I_0}{4}$

(NEW NCERT 12th Page No. 265 and 266)

25. (2)

$\text{rms} = \frac{\text{Peak value}}{\sqrt{2}}$

(NEW NCERT 12th Page No. 178, 179 and 180)

26. (3)

$v \propto \sqrt{\text{Tension}}$

$\frac{v_i}{v_f} = \sqrt{\frac{T_i}{T_f}}$

$\frac{v_i}{v_f} = \sqrt{\frac{T}{T/2}}$

$\frac{v_i}{v_f} = \sqrt{\frac{2}{1}} = \sqrt{2}:1$

(NEW NCERT 11th Page No. 284, 285 and 286)

27. (1)

The force on a charged particle moving in a uniform magnetic field always acts in a direction perpendicular to the direction of motion of the charge. Therefore, the work done by magnetic force on the charge is zero. The kinetic energy of the charged particle does not change.

(NEW NCERT 12th Page No. 112 and 113)

28. (4)

$R(T) = R_0\left[1 + \alpha(T - T_0)\right]$

Here, $R(T) = 1.2\Omega, \quad R_0 = 1.0\Omega$

$\alpha = 3.8 \times 10^{-3}/^\circ\text{C}$ and $T_0 = 20^\circ\text{C}$

Substituting the values, we have

$1.2 = 1.0\left[1 + 3.8 \times 10^{-3}(T - 20)\right]$

or $3.8 \times 10^{-3}(T - 20) = 0.2$

Solving this, we get

$T \approx 72.6^\circ C$

(NEW NCERT 12th Page No. 90 and 91)

29. (4)

$E = P \times t = 10 \times 10^3 \times 2 \times 3600$ J

$= 72 \times 10^6$ J

(NEW NCERT 11th Page No. 83)

30. (3)

$\vec{I} = \frac{\vec{F}}{m}$

Magnitude of gravitational field intensity,

$I = \frac{F}{m} = \frac{5N}{100 \times 10^{-3} kg} = 50\,\text{N/kg}$

(NEW NCERT 11th Page No. 134 and 135)

31. (3)

Mass defect,

$\Delta m = 0.4\%$ of 1 kg

$= \frac{0.4}{100} \times 1\text{kg} = 4 \times 10^{-3}\text{kg}$

Energy Liberated,

$E = (\Delta m)c^2$

$= 4 \times 10^{-3} \times (3 \times 10^8)^2$ J

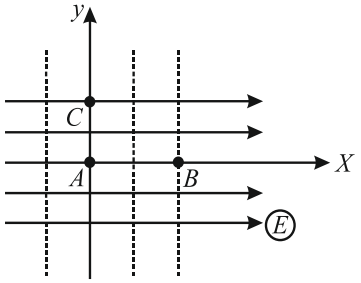
$= 3.6 \times 10^{14}$ J

(NEW NCERT 12th Page No. 310, 311, 312 and 313)

32. (2)

Potential decreases in the direction of electric field.

Dotted lines are equipotential lines.



$V_A = V_C$ and $V_A > V_B$

(NEW NCERT 12th Page No. 54 and 55)

33. (3)

Radius of wire $= \frac{10^{-2}}{\sqrt{\pi}}$ m

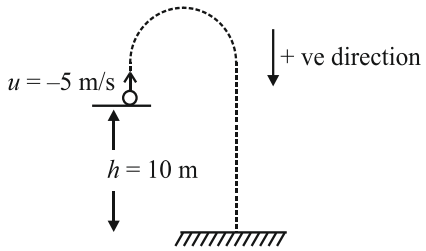
Cross sectional area A = $\pi r^2 = 10^{-4} m^2$

$J = \frac{I}{A} = \left(\frac{V}{R}\right)\frac{1}{A} = \frac{El}{RA}$

$J = \frac{10 \times 10}{10 \times 10^{-4}} = 10^5 \text{A/m}^2$

(NEW NCERT 12th Page No. 85, 86, 87 and 88)

34. (3)



Using equation of motion:

$v^2 = u^2 + 2as$

$v^2 = (-5)^2 + 2 \times 10 \times 10$

$v^2 = 25 + 200$

$v^2 = 225$

$v = \sqrt{225}$ m/s

v = 15 m/s

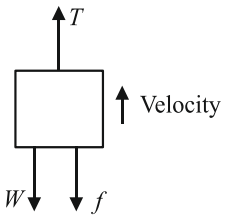
(NEW NCERT 11th Page No. 17, 18, 19, 20 and 21)

35. (4)

Constant velocity $\Rightarrow a = 0$

$T = W + f$

= 25000 + 3500 = 28500 N



$\Rightarrow$ Power = Tv

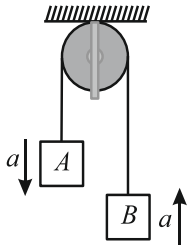
= 28500 × 0.5

= 14250 W

(NEW NCERT 11th Page No. 64, 65 and 66)

SECTION-B

36. (3)



Net pulling force on the system is $(m_A - m_B)g$

= (3 – 2) g = g

Total mass being pulled is $m_A + m_B$ or 5 kg

$\therefore \quad a = \frac{\text{Net pulling force}}{\text{Total mass}} = \frac{g}{5}$

Now, $a_{COM} = \frac{m_A a_A + m_B a_B}{m_A + m_B}$

$= \frac{(3)(a) - (2)(a)}{3+2} = \frac{a}{5} = \frac{g}{25}$ (downwards)

(NEW NCERT 11th Page No. 99 and 100)

37. (1)

Volume = $l \times b \times t$ = 5.234 × 1.002 × 0.0205 m^3

= 0.1075116 m^3

According to the arithmetic operation rule for multiplication, the number of significant figures in the product is same as the smallest number of significant figures in any of the factors. Here, it is 3 (in 2.05 cm). Therefore, the volume upto correct significant figures is 0.108 m^3.

(NEW NCERT 11th Page No. 3, 4, 5 and 6)

38. (3)

$Q = CV \Rightarrow C = \frac{Q}{V} = \frac{ne}{V}$

Given V = 200 volts; $n = 12.5 \times 10^{15}$

$\therefore \quad C = \frac{12.5 \times 10^{15} \times 1.6 \times 10^{-19}}{200} = 10\mu F$

(NEW NCERT 12th Page No. 67 and 68)

39. (1)

Let the mass density of the sphere be ρ, the mass of sphere be *M* and the mass of the particle at point *P* be *m*.

Force on the mass *m* due the solid sphere is

$$F_1 = \frac{GMm}{(3R)^2}$$

$$\Rightarrow F_1 = \frac{GMm}{9R^2}$$

Mass of cavity, $M_C = \rho \times \text{Volume of cavity}$

$$M_C = \frac{M}{\frac{4}{3}\pi R^3} \times \frac{4}{3}\pi\left(\frac{R}{2}\right)^3$$

$$\therefore\ M_C = \frac{M}{8}$$

F_2 = force due to whole sphere – force due to the sphere forming the cavity

Substituting the values,

$$\Rightarrow F_2 = \frac{GMm}{(3R)^2} - \frac{GMm}{8\left(\frac{5R}{2}\right)^2}$$

$$\Rightarrow F_2 = \frac{GMm}{9R^2} - \frac{GMm}{50R^2}$$

$$\Rightarrow F_2 = \frac{41GMm}{450R^2}$$

Ratio of the forces will be;

$$\frac{F_1}{F_2} = \frac{1}{9} \times \frac{450}{41}$$

$$\therefore\ \frac{F_1}{F_2} = \frac{50}{41}$$

(NEW NCERT 11th Page No. 129, 130 and 131)

40. (3)

In stationary lift: $T = 2\pi\sqrt{\frac{\ell}{g}}$

In accelerated lift: $\frac{2T}{3} = 2\pi\sqrt{\frac{\ell}{g+a}}$

Divide (i) by (ii)

$$\frac{3}{2} = \sqrt{\frac{g+a}{g}} \text{ or } 9g = 4(g+a)$$

or $a = \frac{5}{4}g$

(NEW NCERT 11th Page No. 270 and 271)

41. (1)

Young's modulus of a material, $Y = \frac{\text{Stress}}{\text{Strain}}$.

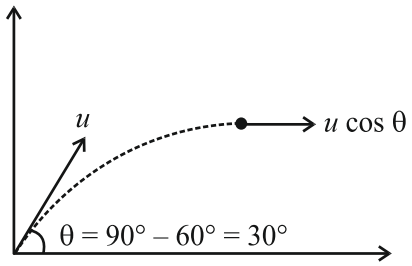
Here, stress = $\frac{\text{Restoring force}}{\text{Area}}$.

As restoring force is zero. Therefore, $Y = 0$.

(NEW NCERT 11th Page No. 170, 171, 172, 173 and 174)

42. (4)

At the highest point, only horizontal component of velocity remains $\Rightarrow u_x = u\cos\theta$



$$u_x = u\cos\theta = 20\ \cos 30°$$

$$= 20 \times \frac{\sqrt{3}}{2} = 10\sqrt{3}\,\text{m/s}$$

(NEW NCERT 11th Page No. 38, 39 and 40)

43. (1)

$$\mu = \frac{c}{v} \Rightarrow v \propto \frac{1}{\mu}$$

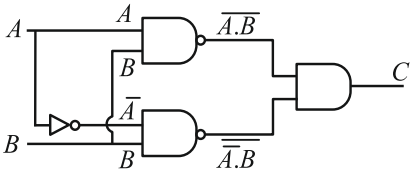
Critical angle;

$$\text{Sin } i_c = \frac{\mu_R}{\mu_D} = \frac{v_D}{v_R} = \frac{1.5}{2} = \frac{3}{4}$$

$$i_c = \sin^{-1}\left(\frac{3}{4}\right) = \sin^{-1}(0.750)$$

(NEW NCERT 12th Page No. 229, 230, 231 and 232)

44. (4)



$$C = \overline{A.B}.\overline{\overline{A}.B}$$

Using De-morgan theorem

$$C = \overline{A.B + \overline{A}.B}$$

$$C = \overline{B(A+\overline{A})} = \overline{B}$$

Therefore

A	B	C
0	0	1
0	1	0
1	0	1
1	1	0

(NEW NCERT 12th Page No. 491, 492, 493 and 494)

45. (2)

$$Z = \sqrt{R^2 + (X_L - X_C)^2} = 10\sqrt{2}\,\Omega$$

$$\Rightarrow\ I_0 = \frac{V_0}{Z} = \frac{100}{10\sqrt{2}} = \frac{10}{\sqrt{2}}\,\text{A}$$

$\because$ Ammeter reads RMS value, so its readings

$= \frac{10}{\sqrt{2}\sqrt{2}} = 5\,\text{A}$

So, $V_R = 5\times 10 = 50\,\text{V}$ and $V_C = 5\times 20 = 100\,\text{V}$.

(NEW NCERT 12th Page No. 186, 187, 188 and 189)

46. (1)

$\frac{x}{2} = \frac{\ell}{100-\ell}$ ….. (i)

When they are interchanged

$\frac{2}{x} = \frac{\ell'}{100-\ell'} = \frac{\ell-20}{100-(\ell-20)}$

$\frac{2}{x} = \frac{\ell-20}{120-\ell}$ ….. (ii)

From equation (i) and (ii)

$\frac{\ell-20}{120-\ell} = \frac{100-\ell}{\ell}$

$\Rightarrow \quad \ell^2 - 20\ell = 12000 - 120\ell - 100\ell + \ell^2$

$\Rightarrow \quad 200 - \ell = 12000$

$\Rightarrow \quad \ell = 60\,\text{cm}$

Substituting this in equation (ii),

$\frac{2}{x} = \frac{60-20}{120-60}$

$\Rightarrow \quad \frac{2}{x} = \frac{40}{60}$

$\Rightarrow \quad x = 3\Omega$

(NEW NCERT 12th Page No. 100, 101 and 102)

47. (1)

$\oint \vec{B}.\vec{dl} = \mu_0 i_{\text{net}}$

$\therefore \quad i_{\text{net}} = \frac{\oint \vec{B}.\vec{dl}}{\mu_0} = \frac{7.66\times 10^{-7}}{4\pi\times 10^{-7}}$

$\approx 0.6\,\text{A}$

(NEW NCERT 12th Page No. 117, 118, 119 and 120)

48. (1)

Given, $\phi_B = 2(bt^2 - at^3)$

$\therefore \quad |e| = \left|\frac{d\phi_B}{dt}\right| = 4bt - 6at^2$

$\therefore$ Induced current, $i = \frac{|e|}{R} = \frac{4bt-6at^2}{2}$

$= 2bt - 3at^2$

For current to be maximum, $\frac{di}{dt} = 0$

$\therefore \quad 2b - 6at = 0$

or $\quad t = \frac{b}{3a}$

i.e., at $t = \frac{b}{3a}$, current is maximum. This maximum current is

$i_{\max} = 2b\left(\frac{b}{3a}\right) - 3a\left(\frac{b}{3a}\right)^2$

$= \frac{2b^2}{3a} - \frac{b^2}{3a}$

$= \frac{b^2}{3a}$

Substituting the given values of *a* and *b*, we have

$i_{\max} = \frac{(6)^2}{3(2)} = 6.0\,\text{A}$

(NEW NCERT 11th Page No. 157, 158 and 159)

49. (2)

The direction of dipole moment is from negative charge to positive charge.

From the figure, the *−ve* charge of dipole is nearer to infinite line of charge than the *+ve* charge of dipole. So, the force on *−ve* charge of dipole towards line charge is more than that on *+ve* charge of dipole away from the line charge. Thus, the net force on dipole is towards the line charge.

The net force is along the axis of dipole so there is no torque produced due to this force.

(NEW NCERT 12th Page No. 27 and 28)

50. (2)

Nuclear radius: $R = R_0(A)^{1/3}$

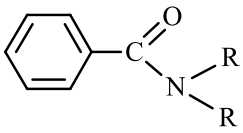
$\frac{R(125)}{R(27)} = \frac{R_0(125)^{1/3}}{R_0(27)^{1/3}} = \frac{5}{3}$

(NEW NCERT 11th Page No. 309)

(CHEMISTRY)

SECTION-A

51. (1)

Partial positive charge is least in;  because in this case the lone pair of e^- of N atom more effectively participate in resonance with $>C=O$ group.

(NEW NCERT 12th Part-II Page No. 249)

52. (1)

(A) Chromyl chloride test (CrO_2Cl_2) $\longrightarrow Cl^-$

(B) Ring test $[Fe(H_2O)_5(NO)]^{+2} \longrightarrow NO_3^-$

(C) Smell of vinegar (CH_3–COOH) $\longrightarrow CH_3$–COO^-

(D) Smell of rotten egg (H_2S) $\longrightarrow S^{2-}$

(NEW NCERT 11th Part-II Page No. 284)

53. (1)

Anhy $CuSO_4$ is white but $CuSO_4.5H_2O$ is blue in colour.

(NEW NCERT 12th Part-I Page No. 103)

54. (1)

Fe^{3+}:[Ar]$3d^5$

(NEW NCERT 11th Part-I Page No. 63)

55. (2)

$$C_2H_5OH \xrightarrow{P_4/I_2} C_2H_5I \xrightarrow[KOH]{Alc.} CH_2=CH_2 \xrightarrow{HBr} CH_3CH_2Br$$

(NEW NCERT 12th Part-II Page No. 179)

56. (2)

For n = 4, orbitals are:-

0		−1	0	+1		−2	−1	0	+1	+2
(s)			(p)				(d)			

−3	−2	−1	0	+1	+2	+3
(f)						

Total number of orbitals having $m_l = \pm 1 = 6$

Total number of electrons having $\left\{m_l = \pm 1 \text{ and } m_s = -\frac{1}{2}\right\} = 6$

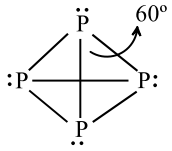
(NEW NCERT 11th Part-I Page No. 54)

57. (4)

Dipole moment cannot tell anything about the bond energies of all bonds within the molecule.

(NEW NCERT 11th Part-I Page No. 111)

58. (1)

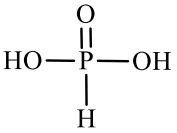


. 4- lone pairs
. 8 P–P–P bond angles of 60°
. 6 P–P single bonds

(OLD NCERT 12th Part-I Page No. 175)

59. (3)

$$PCl_3 + 3H_2O \longrightarrow \underset{\text{Orthophosphorous acid}}{H_3PO_3} + 3HCl$$

 → Basicity = 2

(OLD NCERT 12th Part-I Page No. 177)

60. (1)

$$\overset{+6}{Xe}F_6 + H_2O \longrightarrow \overset{+6}{Xe}OF_4 + 2HF$$

$$\overset{+6}{Xe}F_6 + 2H_2O \longrightarrow \overset{+6}{Xe}O_2F_2 + 4HF$$

(OLD NCERT 12th Part-I Page No. 205)

61. (1)

i (Na_2SO_4) = 3 and i (KCl) = 2

Since $\Delta T_b \propto i$, and more the ΔT_b, more will be the BP of solution.

i ($MgCl_2$) = 3 and i (NaCl) = 2

Since $\Delta T_f \propto i$ and more the ΔT_f, lesser will be the Freezing point of solution.

(NEW NCERT 12th Part-I Page No. 17)

62. (2)

$C_4H_8 + 6O_2 \rightarrow 4CO_2 + 4H_2O$

No. of moles of $C_4H_8 = \frac{280}{56} \times 10^3$

$= 5 \times 10^3$

No. of moles of O_2 required = $5 \times 10^3 \times 6$

mass of O_2 required = $30 \times 10^3 \times 32$ g

$= 960 \times 10^3$ g

= 960 kg

(NEW NCERT 11th Part-I Page No. 20)

63. (4)

On increasing temperature

$t_{1/2}$ decreases.

(NEW NCERT 12th Part-I Page No. 72)

64. (3)

For salt of strong acid and strong base, no salt hydrolysis aq. Solution of and solution will be neutral so pH = 7.

(NEW NCERT 11th Part-I Page No. 193)

65. **(2)**

(i) SF_4 σ–Bond pair = 4, Lone pair = 1

(ii) XeO_2F_2 σ–Bond pair = 4, Lone pair = 1

(iii) $ClOF_3$ σ–Bond pair = 4, Lone pair = 1

(NEW NCERT 11th Part-I Page No. 121)

66. **(3)**

$3Cl_2 + 6OH^- \rightarrow 5Cl^- + ClO_3^- + 3H_2O$

Per molecule of Cl_2, one H_2O molecule is produced

(NEW NCERT 11th Part-II Page No. 242)

67. **(2)**

$Mg^{+2} + 2e^- \rightarrow Mg$

For 1 mol Mg, 2F is required.

(NEW NCERT 12th Part-I Page No. 51)

68. **(4)**

For same temperature change

$$\ln\left(\frac{k_2}{k_1}\right) \propto E_a$$

$\mu \propto E_a$

(NEW NCERT 12th Part-I Page No. 78)

69. **(2)**

$H_2 \rightarrow 2H^+ + 2e^-$

$$E_{cell} = 0 - \frac{0.0591}{2}\log\frac{[H^+]^2}{P_{H_2}}$$

$$= 0 - \frac{0.0591}{2}\log 10^{-8} = 8 \times \frac{0.0591}{2} = 0.236V$$

(NEW NCERT 12th Part-I Page No. 36)

70. **(1)**

$$K = \frac{1}{t_2 - t_1}\ln\frac{[R]_1}{[R]_2}$$

$$K = \frac{2.303}{(20-10)\times 60}\log\frac{0.06}{0.02} = 1.83\times 10^{-3}\ sec^{-1}$$

(NEW NCERT 12th Part-I Page No. 72)

71. **(4)**

Bond order of O_2^{2-} is one.

(NEW NCERT 11th Part-I Page No. 129)

72. **(4)**

Only Gd^{+3} ($[Xe]4f^7$) has 7 unpaired electron.

(NEW NCERT 12th Part-I Page No. 101)

73. **(3)**

Electron gain enthalpy order is Cl > F > Br

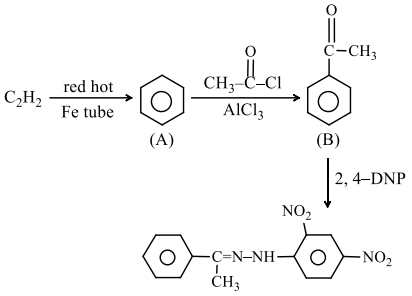
(NEW NCERT 11th Part-I Page No. 89)

74. **(3)**

The atomic radius of Ga is less than that of Al. This is due to the presence of d-electron in Ga which do not shield the nucleus effectively.

(NEW NCERT 11th Part-I Page No. 87)

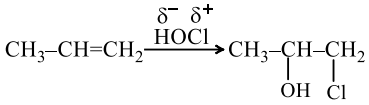
75. **(4)**



(NEW NCERT 12th Part-II Page No. 238)

76. **(4)**

Markovnikov's addition takes place



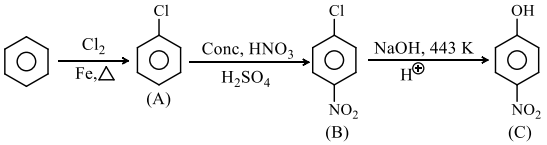
(NEW NCERT 11th Part-II Page No. 312)

77. **(1)**

Reaction of alkyl chlorides or bromides with NaI in acetone gives alkyl iodides. This reaction is known as Finkelstein reaction.

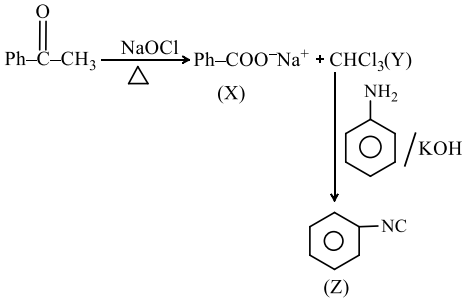
(NEW NCERT 12th Part-II Page No. 165)

78. **(3)**



(NEW NCERT 11th Part-II Page No. 322)

79. **(1)**



Formation of Z take place through carbylamine reaction.

(NEW NCERT 12th Part-II Page No. 271)

80. **(4)**

$K_{SP} = 4S^3$

$S = 10^{-3}$ g/L or $= \frac{10^{-3}}{100}$ mol/L $= 10^{-5}$ mol/L

$K_{SP} = 4(10^{-5})^3 = 4 \times 10^{-15}\ M^3$

(NEW NCERT 11th Part-I Page No. 204)

81. (3)

Acidic strength directly proportional to stability of conjugate base.

(NEW NCERT 12th Part-II Page No. 251)

82. (4)

- Angular momentum in 4th orbit = $\frac{nh}{2\pi} = \frac{2h}{\pi}$
- $r_1 = 0.529 \times 10^{-10}$ m
- $v_n = 2.18 \times 10^6 \times \frac{z}{n}$ m/sec

  $v_2 = 1.09 \times 10^6$ m/s

(NEW NCERT 11th Part-I Page No. 46)

83. (3)

Maximum melting point in 3d series is of Cr because of maximum no. of unpaired e^-. Hence large number of metallic bonding.

(NEW NCERT 12th Part-I Page No. 97)

84. (2)

Due to large size of Cl, HCl does not show H–bonding.

(NEW NCERT 11th Part-I Page No. 131)

85. (1)

Alcohols are soluble in water due to the formation of hydrogen bond.

(NEW NCERT 12th Part-II Page No. 203)

SECTION-B

86. (4)

$N_2(g) + 2H_2O(g) \rightleftharpoons 2NO(g) + 2H_2(g)$

According to Le-Chatelier's principle in above reaction.

On increasing the concentration of N_2 reaction will move forward and more NO will be formed and on decreasing concentration of H_2 reaction will move in forward direction.

On increasing pressure reaction goes in backward direction where gaseous moles decreases.

(NEW NCERT 11th Part-I Page No. 185)

87. (3)

$NH_3 + H^{\oplus} \longrightarrow NH_4^{\oplus}$

(base) (conjugate acid)

- K_w increases with increase in Temperature.

(NEW NCERT 11th Part-I Page No. 190)

88. (3)

Gabriel's Phthalimide synthesis is used for the preparation of aliphatic primary amine.

(NEW NCERT 12th Part-II Page No. 264)

89. (2)

$CH_3–CH_2–OH$ give's iodoform test

Acetic acid contain three α–Hydrogen atom.

(NEW NCERT 12th Part-II Page No. 240)

90. (1)

$Hg_2Cl_2 + 2NH_4OH \longrightarrow Hg\begin{matrix}NH_2\\Cl\end{matrix} + NH_4Cl + 2H_2O + Hg$

Black

(NEW NCERT 11th Part-I Page No. 284)

91. (4)

Cr^{2+} is a reducing as its configuration from d^4 to d^3 the having half filled t_2g level. On the other hand, the change from Mn^{3+} (d^4) to Mn^{2+} result in the half filled (d^5) configuration which has extra stability.

(NEW NCERT 12th Part-I Page No. 98)

92. (2)

$H_2(g) + I_2(g) \rightarrow 2HI(g)$

$\Delta H = (B.E_r – B.E_p) = 90 + 110 – 2 \times 220 = –240$ kJ

(NEW NCERT 11th Part-I Page No. 154)

93. (1)

At equilibrium $\Delta G = 0$

(NEW NCERT 11th Part-I Page No. 162)

94. (2)

$R–\underset{(2^o)}{NH}–R + PhSO_2Cl \longrightarrow PhSO_2–\underset{\underset{R}{|}}{N}–R + HCl$

(Insoluble in alkali due to absence of acidic -H)

(NEW NCERT 12th Part-II Page No. 271)

95. (2)

Aspartic acid and glutamic acid are acidic amino acid.

(NEW NCERT 12th Part-II Page No. 290)

96. (1)

In HNO_3, N is in its highest oxidation state (+5), so it can not be further oxidised and hence can't behave as a reducing agent.

(OLD NCERT 12th Part-I Page No. 173)

97. (4)

CO form synergic bonding.

(NEW NCERT 12th Part-I Page No. 135)

98. (1)

On decomposition, $BaCO_3$ liberates CO_2 as

$\underset{197\text{ g}}{BaCO_3} \rightarrow BaO + \underset{22.4\text{ L at STP}}{CO_2}\uparrow$

$\because$ 197 g of $BaCO_3$ gives = 22.4 L of CO_2 at STP

39.4 g of $BaCO_3$ will give $= \frac{22.4 \times 39.4}{197} = 4.48$ L

(NEW NCERT 11th Part-I Page No. 20)

99. (4)

Concentration terms which involve volume, depends on temperature.

(NEW NCERT 11th Part-I Page No. 23)

100. (2)

$\frac{1}{2}Cl_2(aq) + e^- \rightarrow Cl^-(aq)$

(NEW NCERT 12th Part-I Page No. 33)

(BOTANY)

SECTION-A

101. (4)

For plants, scientific names are based on agreed principles and criteria, which are provided in International Code for Botanical Nomenclature (ICBN). Animal taxonomists have evolved International Code of Zoological Nomenclature (ICZN).

(NEW NCERT 11th Pg. No. 4)

102. (4)

With the exception of yeasts which are unicellular, fungi are filamentous. Their bodies consist of long, slender thread-like structures called hyphae. The network of hyphae is known as mycelium. Some hyphae are continuous tubes filled with multinucleated cytoplasm – these are called coenocytic hyphae. Others have septae or cross walls in their hyphae.

(NEW NCERT 11th Pg. No. 16)

103. (1)

The members of rhodophyceae are commonly called red algae because of the predominance of the red pigment, r-phycoerythrin in their body.

(NEW NCERT 11th Pg. No. 27)

104. (4)

In pea and bean flowers, there are five petals, the largest (standard) overlaps the two lateral petals (wings) which in turn overlap the two smallest anterior petals (keel); this type of aestivation is known as vexillary or papilionaceous.

(NEW NCERT 11th Pg. No. 64)

105. (3)

In dicot roots, the innermost layer of the cortex is called endodermis. It comprises a single layer of barrelshaped cells without any intercellular spaces. The tangential as well as radial walls of the endodermal cells have a deposition of water-impermeable, waxy material suberin in the form of casparian strips. The parenchymatous cells which lie between the xylem and the phloem are called conjuctive tissue. All tissues on the innerside of the endodermis such as pericycle, vascular bundles and pith constitute the stele.

(NEW NCERT 11th Pg. No. 74)

106. (4)

Reserve materials in prokaryotic cells are stored in the cytoplasm in the form of inclusion bodies. These are not bound by any membrane system and lie free in the cytoplasm, e.g., phosphate granules, cyanophycean granules and glycogen granules. Gas vacuoles are found in blue green and purple and green photosynthetic bacteria.

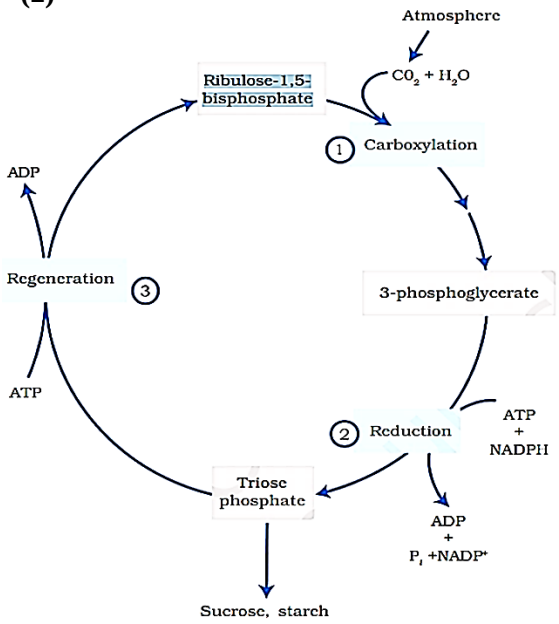
(NEW NCERT 11th Pg. No. 91)

107. (3)

Recombination nodules appears in the pachytene phase. The X-shaped structures, formed during diplotene phase are called chiasmata.

(NEW NCERT 11th Pg. No. 126)

108. (2)



(NEW NCERT 11th Pg. No. 144)

109. (4)

The electrons, as they move through the electron transport system, release enough energy that are trapped to synthesise ATP. O_2 is the ultimate acceptor of electrons in ETS of mitochondria and it gets reduced to water.

(NEW NCERT 11th Pg. No. 165)

110. (2)

Cytokinins have specific effects on cytokinesis, and were discovered as kinetin (a modified form of adenine, a purine) from the autoclaved herring sperm DNA. Kinetin does not occur naturally in plants.

(NEW NCERT 11th Pg. No. 176)

111. (1)

In cleistogamous flowers, the anthers and stigma lie close to each other. When anthers dehisce in the flower buds, pollen grains come in contact with the stigma to effect pollination. Thus, cleistogamous flowers are invariably autogamous as there is no chance of cross-pollen landing on the stigma. Cleistogamous flowers produce assured seed-set even in the absence of pollinators.

(NEW NCERT 12th Pg. No. 12)

112. (1)

Organisms	Sex chromosomes
Male *Drosophila*	XY
Male Birds	ZZ
Female *Drosophila*	XX
Female Birds	ZW

(NEW NCERT 12th Pg. No. 70, 71)

113. (4)

GUG codes for amino acid Valine.

(NEW NCERT 12th Pg. No. 96)

114. (4)

Aspergillus niger	Citric acid
Acetobacter aceti	Acetic acid
Clostridium butylicum	Butyric acid
Lactobacillus	Lactic acid

(NEW NCERT 12th Pg. No. 153)

115. (1)

Detritivores (e.g., earthworm) break down detritus into smaller particles and this process is called fragmentation. By the process of leaching, water-soluble inorganic nutrients go down into the soil horizon and get precipitated as unavailable salts.

(NEW NCERT 12th Pg. No. 207)

116. (3)

Each trophic level has a certain mass of living material at a particular time called as the standing crop.

(NEW NCERT 12th Pg. No. 211)

117. (3)

(i) Genetic diversity: A single species might show high diversity at the genetic level over its distributional range. The genetic variation shown by the medicinal plant *Rauwolfia vomitoria* growing in different Himalayan ranges might be in terms of the potency and concentration of the active chemical (reserpine) that the plant produces. India has more than 50,000 genetically different strains of rice, and 1,000 varieties of mango.

(ii) Species diversity: The diversity at the species level. For example, the Western Ghats have a greater amphibian species diversity than the Eastern Ghats.

(iii) Ecological diversity: At the ecosystem level, India, for instance, with its deserts, rain forests, mangroves, coral reefs, wetlands, estuaries, and alpine meadows has a greater ecosystem diversity than a Scandinavian country like Norway.

(NEW NCERT 12th Pg. No. 217)

118. (4)

The cells derived from root apical and shoot-apical meristems and cambium differentiate and mature to perform specific functions. This act leading to maturation is termed as differentiation. During differentiation, cells undergo few to major structural changes both in their cell walls and protoplasm.

(NEW NCERT 11th Pg. No. 172)

119. (3)

Plasmid, mesosomes, and nucleoid are the structures that are present only in the prokaryotic cells.

(NEW NCERT 11th Pg. No. 90, 91)

120. (4)

Anaphase II begins with the simultaneous splitting of the centromere of each chromosome.

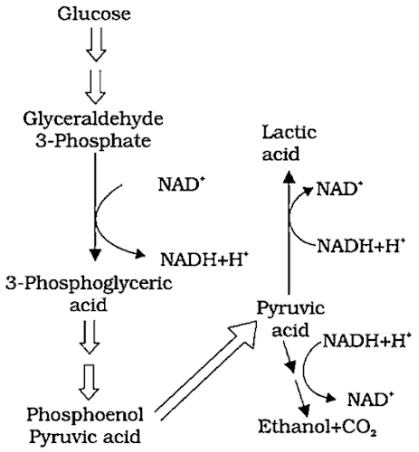
(NEW NCERT 11th Pg. No. 127)

121. (3)

Splitting of water release protons in the thylakoid lumen during light reaction.

(NEW NCERT 11th Pg. No. 139)

122. (3)



(NEW NCERT 11th Pg. No. 157)

123. (2)

In arithmetic growth, following mitotic cell division, only one daughter cell continues to divide while the other differentiates and matures.

(NEW NCERT 11th Pg. No. 170)

124. (1)

Outbreeding device	Self-incompatibility
Pollen-pistil interaction	Formation of pollen tube from compatible pollen
Emasculation	A step of artificial hybridization
Triple fusion	Occurs only in angiosperms

(NEW NCERT 12th Pg. No. 15, 17, 18)

125. (3)

In bacteria, there are three major types of RNAs: mRNA (messenger RNA), tRNA (transfer RNA), and rRNA (ribosomal RNA). All three RNAs are needed to synthesise a protein in a cell. The mRNA provides the template, tRNA brings amino acids and reads the genetic code, and rRNAs play structural and catalytic role during translation. There is single DNA-dependent RNA polymerase that catalyses transcription of all types of RNA in bacteria. RNA polymerase binds to promoter and initiates transcription.

(NEW NCERT 12th Pg. No. 93)

126. (3)

Haemophilia is a sex-linked recessive disease, which shows its transmission from unaffected carrier female to some of the male progeny has been widely studied. In this disease, a single protein that is a part of the cascade of proteins involved in the clotting of blood is affected. Due to this, in an affected individual a simple cut will result in non-stop bleeding. The heterozygous female (carrier) for haemophilia may transmit the disease to sons. The possibility of a female becoming a haemophilic is extremely rare because mother of such a female has to be at least carrier and the father should be haemophilic.

(NEW NCERT 12th Pg. No. 74)

127. (3)

Many parasites have evolved to be host-specific (they can parasitise only a single species of host) in such a way that both host and the parasite tend to co-evolve; that is, if the host evolves special mechanisms for rejecting or resisting the parasite, the parasite has to evolve mechanisms to counteract and neutralise them, in order to be successful with the same host species.

(NEW NCERT 12th Pg. No. 200)

128. (4)

Plant and animal cells are different as the former possess cell walls, plastids and a large central vacuole which are absent in animal cells. All eukaryotic cells are not identical,

(NEW NCERT 11th Pg. No. 92)

129. (3)

Chemiosmosis requires a membrane, a proton pump, a proton gradient and ATP synthase.

(NEW NCERT 11th Pg. No. 142)

130. (2)

All carbohydrates are usually first converted into glucose before they are used for respiration. Fats would need to be broken down into glycerol and fatty acids first. Glycerol would enter the pathway after being converted to PGAL.

(NEW NCERT 11th Pg. No. 162)

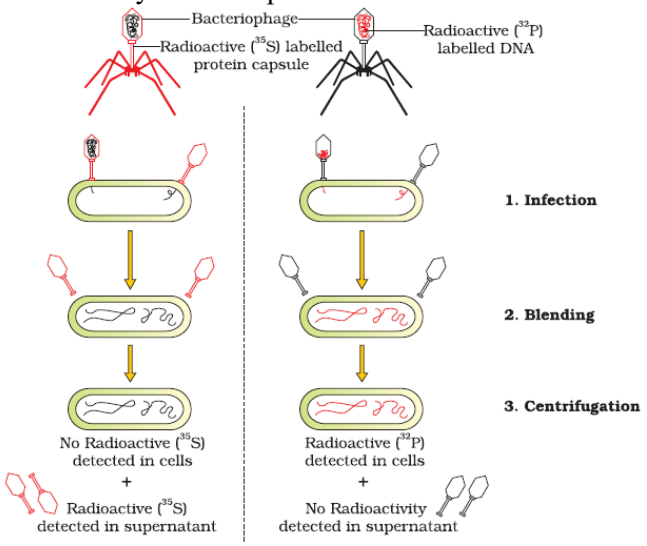
131. (2)

Majority of plants use biotic agents for pollination.

(NEW NCERT 12th Pg. No. 12)

132. (1)

Hershey-Chase experiment:



(NEW NCERT 12th Pg. No. 86)

133. (2)

Failure of segregation of chromatids during cell division cycle results in the gain or loss of a chromosome(s), called aneuploidy. For example, Down's syndrome results in the gain of extra copy of chromosome 21. Similarly, Turner's syndrome results due to loss of an X chromosome in human females.

(NEW NCERT 12th Pg. No. 75, 76)

134. (3)

Allele from Parent 1	Allele from Parent 2	Genotype of offspring	Blood types of offspring
I^A	I^A	I^AI^A	A
I^A	I^B	I^AI^B	AB
I^A	i	I^Ai	A
I^B	I^A	I^AI^B	AB
I^B	I^B	I^BI^B	B
I^B	i	I^Bi	B
i	i	ii	O

(NEW NCERT 12th Pg. No. 61)

135. (1)

In eukaryotes, there is a set of positively charged, basic proteins called histones. A protein acquires charge depending upon the abundance of amino acids residues with charged side chains. Histones are rich in the basic amino acid residues lysine and arginine. Both the amino acid residues carry positive charges in their side chains.

(NEW NCERT 12th Pg. No. 83)

SECTION-B

136. (1)

In pteridophytes, the main plant body is a sporophyte which is differentiated into true root, stem and leaves. The spores germinate to give rise to inconspicuous, small but multicellular, free-living, mostly photosynthetic thalloid gametophytes called prothallus.

(NEW NCERT 11th Pg. No. 30, 32)

137. (2)

In racemose type of inflorescences the main axis continues to grow, the flowers are borne laterally in an acropetal succession. In cymose type of inflorescence the main axis terminates in a flower, hence is limited in growth. The flowers are borne in a basipetal order.

(NEW NCERT 11th Pg. No. 61)

138. (2)

In dicot leaves mesophyll, which possesses chloroplasts and carry out photosynthesis, is made up of parenchyma. It has two types of cells – the palisade parenchyma and the spongy parenchyma. The adaxially placed palisade parenchyma is made up of elongated cells, which are arranged vertically and parallel to each other. The oval or round and loosely arranged spongy parenchyma is situated below the palisade cells and extends to the lower epidermis.

(NEW NCERT 11th Pg. No. 76)

139. (4)

Cells differ greatly in size, shape and activities. For example, Mycoplasmas, the smallest cells, are only 0.3 µm in length while bacteria could be 3 to 5 µm.

(NEW NCERT 11th Pg. No. 88, 89)

140. (2)

G_1 phase	Cell is metabolically active and continuously grows
S phase	Centriole duplicates
G_0 phase	Cell is metabolically active but do not proliferate
M phase	Most dramatic period

(NEW NCERT 11th Pg. No. 121, 122)

141. (4)

The bundle sheath cells may form several layers around the vascular bundles.

(NEW NCERT 11th Pg. No. 145)

142. (2)

During the process of respiration, oxygen is utilised, and carbon dioxide, water and energy are released as products.

(NEW NCERT 11th Pg. No. 155)

143. (1)

Quantitative comparisons between the growth of living system can also be made in two ways: (i) measurement and the comparison of total growth per unit time is called the absolute growth rate. (ii) The growth of the given system per unit time expressed on a common basis, e.g., per unit initial parameter is called the relative growth rate.

(NEW NCERT 11th Pg. No. 171)

144. (1)

The process of formation of megaspores from the megaspore mother cell is called megasporogenesis.

(NEW NCERT 12th Pg. No. 9)

145. (2)

Genetics is a branch of biology which deals with principles of inheritance and its practices.

Mendel observed that the expression of the characters in the offspring follow a definite pattern in different–first generations (F_1), second (F_2) and so on.

(NEW NCERT 12th Pg. No. 77)

146. (3)

Adenine	Purine
Thymine	Pyrimidine required in DNA synthesis
Uracil	Pyrimidine required in RNA synthesis
Ribose	Sugar required in RNA synthesis

(NEW NCERT 12th Pg. No. 80)

147. (3)

The greater the BOD of waste water, more is its polluting potential.

(NEW NCERT 12th Pg. No. 154)

148. (4)

Individuals belonging to the same population belong to the same species and reproduce both sexually and asexually.

(NEW NCERT 12th Pg. No. 191)

149. (4)

NPP is the remaining biomass or the energy left after utilisation of producers. Secondary productivity is the rate of assimilation of food energy by the consumers.

(NEW NCERT 12th Pg. No. 214)

150. (4)

There are more than 20,000 species of ants, 3,00,000 species of beetles, 28,000 species of fishes and nearly 20,000 species of orchids.

(NEW NCERT 12th Pg. No. 216)

(ZOOLOGY)

SECTION-A

151. (3)

Asthma is a difficulty in breathing causing wheezing due to inflammation of bronchi and bronchioles.

(NEW NCERT 11th Page No. 190)

152. (4)

Neutrophils are the most abundant cells (60-65 per cent) of the total WBCs and basophils are the least (0.5-1 per cent) among them. Lymphocytes constitute 20-25 per cent of total WBC, it is second most abundant cells of the total WBC.

(NEW NCERT 11th Page No. 194)

153. (1)

Muscle fibres present in blood vessels, stomach and intestine are smooth muscle which is fusi form in shape i.e., taper at both ends. It is unbranched and non-striated.

(NEW NCERT 11th Page No. 218)

154. (3)

Neutrophils and monocytes are phagocytic cells which destroy foreign organisms entering the body. Lymphocytes are responsible for immune responses of the body.

(NEW NCERT 11th Page No. 194, 195)

155. (3)

The excretory system of frog consists of a pair of kidneys, ureters, cloaca and urinary bladder. Each kidney is composed of several structural and functional units called uriniferous tubules or nephrons. Two ureters emerge from the kidneys in the male frogs. The ureters act as urinogenital duct which opens into the cloaca.

(NEW NCERT 11th Page No. 82)

156. (4)

When a neuron is not conducting any impulse, i.e., resting, the axonal membrane is comparatively more permeable to potassium ions (K^+) and nearly impermeable to sodium ions (Na^+).

(NEW NCERT 11th Page No. 232)

157. (3)

Collecting duct of nephron allows passage of small amounts of urea into the medullary interstitium to keep up the osmolarity.

(NEW NCERT 11th Page No. 210)

158. (4)

Hypopharynx acts as tongue in cockroach. Antennae have sensory receptors that help in monitoring the environment. Forewings (mesothoracic) called tegmina are opaque dark and leathery and cover the hind wings when at rest. The hind wings are transparent, membranous and are used in flight. Head is triangular in shape and lies anteriorly at right angles to the longitudinal body axis. It is formed by the fusion of six segments and shows great mobility in all directions due to flexible neck.

(OLD NCERT 11th Page No. 112)

159. (2)

Peptide bond is found between successive amino acids in protein molecules. It is formed by amino group ($–NH_2$) of one amino acid with carboxyl group (–COOH) of adjacent amino acid.

(NEW NCERT 11th Page No. 109)

160. (2)

Ventricular systole increases the ventricular pressure causing the closure of tricuspid and bicuspid valves (AV valve) due to attempted backflow of blood into the atria. As the ventricular pressure increases further, the semilunar valves guarding the pulmonary artery (right side) and the aorta (left side) are forced open. During ventricular systole, about 70 ml of blood is pumped by each ventricles which is known as stroke volume.

(NEW NCERT 11th Page No. 199, 200)

161. (4)

Example of poisonous snakes are– *Naja* (Cobra), *Bangarus* (Krait), *Vipera* (Viper). *Calotes* are Garden lizard and *Hemidactylus* are Wall lizard.

(NEW NCERT 11th Page No. 49)

162. (2)

Percentage composition of oxygen is 65%, sulphur is 0.3%, magnesium is 0.1% and nitrogen is 3.3% in human body.

(NEW NCERT 11th Page No. 105)

163. (3)

Examples of Cnidarians are: Hydra, *Aurelia*, *Obelia*, *Physalia* (Portuguese man-of war), *Adamsia* (Sea anemone), *Pennatula* (Sea-pen), *Gorgonia* (Sea-fan) and *Meandrina* (Brain coral). *Aplysia* is a Molluscs, *Echinus* is an Echinoderms, *Scypha* is a poriferans.

(NEW NCERT 11th Page No. 41)

164. (3)

The amount of the filtrate formed by the kidneys per minute is called glomerular filtration rate (GFR). The kidneys have built-in mechanisms for the regulation of glomerular filtration rate. A fall in GFR can activate the JG cells to release renin which can stimulate the glomerular blood flow and thereby the GFR back to normal.

(NEW NCERT 11th Page No. 209)

165. (2)

A hypothalamic hormone called Gonadotrophin releasing hormone (GnRH) stimulates the pituitary synthesis and release of gonadotrophins.

(NEW NCERT 11th Page No. 240)

166. (1)

Gametogenesis in human females i.e., Oogenesis is initiated during the embryonic development stage when a couple of million gamete mother cells (oogonia) are formed within each fetal ovary; no more oogonia are formed and added after birth.

(NEW NCERT 12th Page No. 32)

167. (1)

The junction between a motor neuron and the sarcolemma of the muscle fibre is called the neuromuscular junction or motor-end plate. Stimulation of a muscles fibre by a motor neuron occurs at neuromuscular junction.

(NEW NCERT 11th Page No. 222)

168. (2)

Reptiles (eg: lizard), birds (eg: pigeon), land snails and insects (eg: cockroach) excrete nitrogenous wastes as uric acid in the form of pellet or paste with a minimum loss of water and are called uricotelic animals. Frog excretes urea and thus is a ureotelic animal.

(NEW NCERT 11th Page No. 205)

169. (3)

The use of alcohol during adolescence may have long-term effects. It could lead to heavy drinking in adulthood. The chronic use of drugs and alcohol damages nervous system and liver **(**cirrhosis).

Increased masculinisation is the side effect of the use of anabolic steroids in females.

(NEW NCERT 12th Page No. 146)

170. (1)

As long as the mother breast-feeds the child fully, chances of conception are almost nil. However, this is almost effective only upto a maximum period of six months following parturition. Pills have to be taken daily for a period of 21 days starting preferably within the first five days of menstrual cycle. After a gap of 7 days (during which menstruation occurs) it has to be repeated in the same pattern till the female desires to prevent conception.

(NEW NCERT 12th Page No. 44, 45)

171. (4)

Each seminiferous tubule is lined on its inside by two types of cells called male germ cells (spermatogonia) and Sertoli cells. The male germ cells undergo meiotic divisions finally leading to sperm formation, while Sertoli cells provide nutrition to the germ cells. The regions outside the seminiferous tubules called interstitial spaces, contain small blood vessels and interstitial cells or Leydig cells. Leydig cells synthesise and secrete testicular hormones called androgens.

(NEW NCERT 12th Page No. 27)

172. (1)

Plasmids are autonomously replicating circular extra-chromosomal double stranded DNA. It is used to insert gene in recombinant DNA technology. When the plasmid copies itself, it also makes copies of the inserted gene.

(NEW NCERT 12th Page No. 164)

173. (3)

Tissue matching, blood group matching are essential before undertaking any graft/ transplant and even after this the patient has to take immuno–suppresants all his/her life. The body is able to differentiate 'self' and 'nonself' and the cell-mediated immune response is responsible for the graft rejection.

(NEW NCERT 12th Page No. 136)

174. (1)

A French naturalist Lamarck had said that evolution of life forms had occurred but driven by use and disuse of organs. He gave the examples of Giraffes who in an attempt to forage leaves on tall trees had to adapt by elongation of their necks. As they passed on this acquired character of elongated neck to succeeding generations, Giraffes, slowly, over the years, came to acquire long necks.

(NEW NCERT 12th Page No. 118, 119)

175. (3)

The valves in the heart allows the flow of blood only in one direction, i.e., from the atria to the ventricles and from the ventricles to the pulmonary artery or aorta. These valves prevent any backward flow.

(NEW NCERT 11th Page No. 199)

176. (2)

The forelimbs of birds are modified into wings. The hind limbs generally have scales and are modified for walking, swimming or clasping the tree branches.

(NEW NCERT 11th Page No. 49)

177. (2)

The adrenal gland is composed of two types of tissues. The centrally located tissue is called the adrenal medulla, and outside this lies the adrenal cortex.

(NEW NCERT 11th Page No. 244)

178. (1)

List-I	List-II
Pill	Prevents ovulation
Condom	Prevents sperms reaching cervix
Vasectomy	Semen contains no sperms
Copper T	Prevents implantation

(NEW NCERT 12th Page No. 44, 45)

179. (4)

Amoebiasis, Ascariasis and Typhoid are transmitted by the use of contaminated food and water containing pathogens. Chikungunya spreads through bites of infected *Aedes* mosquito.

(NEW NCERT 12th Page No. 130, 132, 133, 134)

180. (4)

Oogenesis is initiated during the embryonic development stage when a couple of million gamete mother cells (oogonia) are formed within each fetal ovary; no more oogonia are formed and added after birth. These cells start division and enter into prophase-I of the meiotic division and get temporarily arrested at that stage, called primary oocytes. The primary oocyte within the tertiary follicle grows in size and completes its first meiotic division. It is an unequal division resulting in the formation of a large haploid secondary oocyte and a tiny first polar body. Secondary oocyte is haploid cell.

(NEW NCERT 12th Page No. 32)

181. (3)

The separated bands of DNA are cut out from the agarose gel and extracted from the gel piece. This is known as elution.

(NEW NCERT 12th Page No. 168)

182. (4)

The Neanderthal man with a brain size of 1400cc lived in near east and central Asia between 1,00,000-40,000 years back. They used hides to protect their body and buried their dead.

(NEW NCERT 12th Page No. 125)

183. (2)

List-I	List-II
Chloramphenicol	Selectable marker
Ethidium bromide	Agarose gel staining
DNA ligase	Join the cut ends of DNA molecule
Calcium	Makes bacterial cell competent to take up DNA

(NEW NCERT 12th Page No. 165, 169, 170)

184. (3)

List-I	List-II
Gout	Inflammation of joints due to accumulation of uric acid crystals
Osteoporosis	Age related disorder characterised by decreased bone mass and increased chances of bone fracture
Muscular dystrophy	Progressive degeneration of skeletal muscles mostly due to genetic disorders
Myasthenia gravis	Autoimmune disorder affecting neuromuscular junction leading to paralysis of skeletal muscles

(NEW NCERT 11th Page No. 227)

185. (2)

Traditional hybridisation procedures used in plant and animal breeding, very often lead to inclusion and multiplication of undesirable genes along with the desired genes. The techniques of genetic engineering which include creation of recombinant DNA, use of gene cloning and gene transfer, overcome this limitation and allows us to isolate and introduce only one or a set of desirable genes without introducing undesirable genes into the target organism.

(NEW NCERT 12th Page No. 164)

SECTION-B

186. (4)

Expiration takes place when the intra-pulmonary pressure is higher than the atmospheric pressure. Relaxation of the diaphragm and the inter-costal muscles returns the diaphragm and sternum to their normal positions and reduce the thoracic volume and thereby the pulmonary volume. This leads to an increase in intra-pulmonary pressure to slightly above the atmospheric pressure causing the expulsion of air from the lungs, i.e., expiration. Internal intercostals and abdominal muscles contract during forceful expiration.

(NEW NCERT 11th Page No. 185, 186)

187. (2)

Goblet cells are modified columnar cells which are specialised for secretion. It is present in the alimentary canal and secrete mucus.

(OLD NCERT 11th Page No. 102)

188. (1)

During ventricular systole, tricuspid and bicuspid valves remains close and semilunar valves force open. The closing of AV valves produces 'Lub' sound.

(NEW NCERT 11th Page No. 200)

189. (4)

Scapula is a large triangular flat bone situated in the dorsal part of the thorax between the second and the seventh ribs. The striated appearance of muscles is due to the distribution pattern of two important proteins – Actin and Myosin. Each vertebra has a central hollow portion (neural canal) through which the spinal cord passes. During shortening of the muscle, i.e., contraction, the 'I' bands get reduced, whereas the 'A' bands retain the length.

(**NEW NCERT 11th Page No. 219, 222, 225, 226)**

190. (3)

Each branch of axon terminates as a bulb-like structure called synaptic knob which possess synaptic vesicles containing chemicals called neurotransmitters. When an impulse (action potential) arrives at the axon terminal, it stimulates the movement of the synaptic vesicles towards the membrane where they fuse with the plasma membrane and release their neurotransmitters in the synaptic cleft.

(NEW NCERT 11th Page No. 232, 234)

191. (1)

List-I	List-II
Flatworms	Protonephridia
Aquatic amphibians	Ammonotelic
Prawns	Antennal glands
Land snails	Uricotelic

(NEW NCERT 11th Page No. 205, 206)

192. (2)

Body of Amphibian is divisible into head and trunk**.** Tail may be present in some. Respiration is by gills, lungs and through skin. The eyes have eyelids. They have internal skeletal system.

(NEW NCERT 11th Page No. 48)

193. (3)

Hormones are biomolecules and non-nutrient chemicals which act as intercellular messengers and are produced in trace amounts.

(NEW NCERT 11th Page No. 109)

194. (4)

The neural coordination is fast but short-lived. As the nerve fibres do not innervate all cells of the body and the cellular functions need to be continuously regulated; a special kind of coordination and integration has to be provided. This function is carried out by hormones.

(**NEW NCERT 11th Page No. 240)**

195. (3)

Each restriction endonuclease functions by 'inspecting' the length of a DNA sequence. Once it finds its specific recognition sequence, it will bind to the DNA and cut each of the two strands of the double helix at specific points in their sugar-phosphate backbones. Each restriction endonuclease recognises a specific palindromic nucleotide sequences in the DNA. They often generate sticky ends. They are found in bacterial cells as a primitive immune system and restrict the growth of bacteriophage in *Escherichia coli.*

(NEW NCERT 12th Page No. 165, 166)

196. (1)

Menstruation only occurs if the released ovum is not fertilised. Lack of menstruation may be indicative of pregnancy. Amenorrhea i.e., absence of menstrual cycle is observed due to negative feedback exerted by high concentration of progesterone and estrogen secreted from persistent corpus luteum.

(NEW NCERT 12th Page No. 34, 35)

197. (4)

Copper-T is an effective contraceptive device in human females. It increase phagocytosis of sperms within the uterus and the Cu ions released suppress sperm motility and the fertilising capacity of sperms. In barrier methods, ovum and sperms are prevented from physically meeting with the help of barriers. Cu-T does not prevent passage of sperms from vagina upward into fallopian tube.

(NEW NCERT 12th Page No. 44)

198. (2)

Bacteria like *Streptococcus pneumoniae* and *Haemophilus influenzae* are responsible for the disease pneumonia in humans which infects the alveoli (air filled sacs) of the lungs. As a result of the infection, the alveoli get filled with fluid leading to severe problems in respiration. The symptoms of pneumonia include fever, chills, cough and headache. A healthy person acquires the infection by inhaling the droplets/aerosols released by an infected person or even by sharing glasses and utensils with an infected person.

(NEW NCERT 12th Page No. 131)

199. (4)

The Indian Government has set up organisations such as GEAC (Genetic Engineering Approval Committee), which will make decisions regarding the validity of GM research and the safety of introducing GM-organisms for public services.

(NEW NCERT 12th Page No. 184)

■■■

200. (1)

List-I	List-II
Louis Pasteur	Disapproved spontaneous generation theory
Early Greek thinkers	Cosmozoic theory
Oparin and Haladane	Chemical evolution theory
Lamarck	Inheritance of acquired characters

(NEW NCERT 12th Page No. 111)

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